



Australia's **URANIUM** resources, geology and development of deposits

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EXPLORATION AND DISCOVERY

The occurrence of uranium in Australia was known long before the start of any systematic exploration for it. Uranium was first recorded in Australia from Carcoar (NSW) in 1894, where torbernite was found with cobalt mineralisation. Two relatively significant occurrences of uranium were discovered at Mount Painter (South Australia (SA)) in 1906, and at Radium Hill (SA) in 1910 (Fig. 1) (AAEC, 1962).

Historically there have been two main phases of uranium exploration in Australia:

- 1944 to late 1950s,
- 1966 onwards.



Figure 1. Australian uranium deposits and prospects, and areas of uranium exploration in recent years

Exploration from 1944 to late 1950s

Exploration for uranium in Australia started in 1944 in response to requests from the United Kingdom and United States Governments. The known deposits at Mount Painter and Radium Hill were examined by South Australian and Commonwealth Government geologists. To promote exploration, the Commonwealth Government introduced tax-free rewards in 1948 for the discovery of uranium orebodies. Additional inducements to explore and develop uranium resources were introduced in 1949 when a five-year uranium ore-buying pool in Australia was approved, to guarantee fixed prices for uranium ore. In 1952, tax breaks were

introduced for profits earned in uranium mining and treatment (AAEC, 1962). This stimulated the search, particularly around known mineral fields.

In some areas there was feverish activity akin to the gold rushes of last century. Uranium was discovered at Rum Jungle (Northern Territory (NT)) in 1949, in the South Alligator Valley (NT) in 1953, at Mary Kathleen (Queensland (Qld)) in 1954 and at Westmoreland (Qld) in 1956 (Fig. 1). Minor occurrences were found at many places across the continent. Sums totalling the equivalent of about A\$225 000 were paid to 35 prospectors under the reward scheme. Most of the significant discoveries during this period were made by prospectors using geiger counters. As the existing sales contracts became filled there seemed little prospect for further sales, and exploration virtually ceased in the late 1950s (Battey & Hawkins, 1978).

Exploration from 1966 onwards

Annual surveys of uranium exploration in Australia have been carried out since the late 1960s by Commonwealth Government agencies including the Australian Atomic Energy Commission, Bureau of Mineral Resources, Geology and Geophysics (BMR), Bureau of Resource Sciences, and Australian Geological Survey Organisation. The results of these surveys are summarised in Table 1.

Table 1. Uranium exploration expenditure and drilling, 1967 onwards

Year	Exploration expenditure		Drilling ^(a)	Year	Exploration expenditure		Drilling ^(a)
	Current A\$ million	Constant 2000 A\$ million	'000 m		Current A\$ million	Constant 2000 A\$ million	'000 m
1967	1	7.93	n.a.	1984	13	24.98	77
1968	3	23.20	n.a.	1985	13	23.41	56
1969	6	45.00	n.a.	1986	18	29.71	100
1970	8	57.88	n.a.	1987	24	36.53	143
1971	9	61.15	n.a.	1988	26.44	36.88	173.52
1972	13	83.71	n.a.	1989	22.04	29.08	115.43
1973	11	64.73	n.a.	1990	15.74	19.36	105.85
1974	11	56.13	n.a.	1991	14.26	16.99	93.11
1975	8	35.52	65	1992	13.56	16.00	77.79
1976	13	50.76	168	1993	8.28	9.60	37.03
1977	17	59.06	240	1994	6.67	7.59	12.38
1978	25	80.49	335	1995	8.26	8.97	16.13
1979	29	85.74	274	1996	14.92	15.80	19.29
1980	35	93.99	489	1997	23.63	24.95	63.42
1981	38	92.91	425	1998	19.37	20.27	78.09
1982	29	63.80	254	1999	9.61	9.91	33.13
1983	14	27.95	101	2000	7.59	7.59	19.29

n.a. not available.

Note: The aggregate amount of drilling from 1967 to 1971 was 573 000 m.

^(a) Includes diamond core, percussion and auger drilling

The increases in uranium exploration from 1966 onwards were due mainly to the very strong perception that the use of nuclear power for the generation of electricity would escalate sharply. The Commonwealth Government relaxed the existing export policy for uranium in 1967 to encourage exploration, and as a result uranium exploration expenditure increased rapidly during 1967–72 (Fig. 2). Worldwide, there was increased uranium exploration associated with the first oil shock in 1973 when the Organisation of Petroleum Exporting Countries (OPEC), operating as a cartel, reduced supply, causing sharp increases in crude oil prices. In response, many countries began developing nuclear power programs as an alternative to oil for electricity generation.

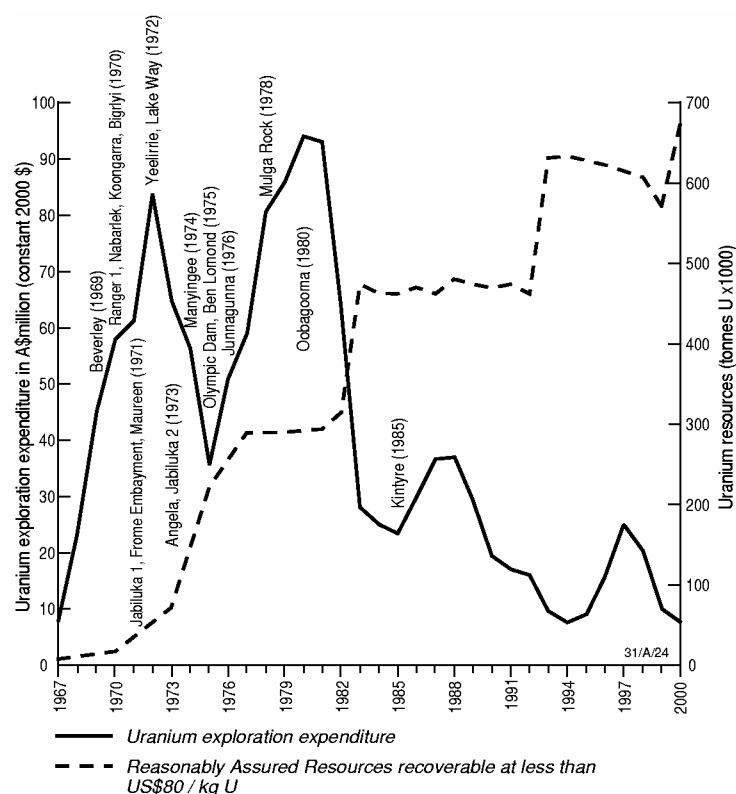


Figure 2. Comparison between annual expenditures on uranium exploration and the discovery of deposits and growth in Australia's uranium resources

In Australia, however, uranium exploration expenditure diminished during the period 1972 to 1975 because the policies of the then Labor Government actively discouraged uranium exploration by private companies. During the latter part of this period Government-funded exploration for uranium was carried out by the Australian Atomic Energy Commission, and the Government purchased a major equity in the Ranger deposit and the Mary Kathleen mine. The period from 1972 to 1975 was also a period of declining exploration for all minerals in Australia after the 'mining boom' of the late 1960s.

Following the election of the Liberal–National Party Coalition to Government in late 1975, exploration rose progressively to a record level of A\$94 million (in constant 2000 A\$) in 1980. Some of the factors which caused this resurgence of uranium exploration were:

- release in 1976 and 1977 of findings from the Ranger Uranium Environmental Inquiry; and the Government's announcement of Australia's uranium policy in 1977, which cleared the way for continuing development of the uranium mining industry in Australia under strictly controlled conditions;
- sharp rises in uranium spot market prices, resulting from overly optimistic forecasts of the future growth in nuclear power generation. Spot market prices rose to peak levels in 1976. Prices negotiated for sales under long-term contracts also increased from the mid-1970s;
- increases in crude oil prices associated with the second oil shock in 1979.

In contrast to the earlier exploration for uranium by prospectors, the exploration from 1966 onwards was undertaken by major companies using advanced exploration techniques and equipment, and with large exploration budgets. The development of multi-channel gamma ray spectrometers with large volume crystal detectors increased the effectiveness of airborne radiometric surveys.

During the 1970s, exploration and mapping resulted in a much better understanding of the distribution of uranium, and consequently the search could be focused more effectively on geological environments considered likely to contain uranium deposits. The regional mapping by BMR and the State geological surveys was used effectively by exploration teams in the selection of areas, and companies conducted airborne radiometric surveys using multi-channel gamma ray spectrometers. This exploration was highly successful and virtually all of Australia's significant deposits were discovered during the period 1969 to 1980 (Fig. 2).